Patent Claims

1. Use of core/shell particles whose shell forms a matrix and whose core is essentially solid, is built up essentially from an inorganic material and has an essentially monodisperse size distribution and is connected to the shell via an interlayer, for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities.

2. Use according to Claim 1, characterised in that the core consists of an electrically and/or magnetically conductive material or has an electrically and/or magnetically conductive layer or has an electrically and/or magnetically conductive core, where the electrically and/or magnetically conductive material is preferably a metal or magnetite.

3. Use according to at least one of the preceding claims, characterised in that the core in the core/shell particles makes up from 10^{-5}% by vol. to about 75% by vol. of the core/shell particle volume, preferably from 10^{-4}% by vol. to 60% by vol. and particularly preferably from about 10^{-3}% by vol. to about 50% by vol. of the core/shell particle volume.

4. Use according to at least one of the preceding claims, characterised in that the shell in the core/shell particles consists of essentially uncrosslinked organic polymers which are grafted onto the core via an at least partially crosslinked interlayer, where the shell preferably comprises from poly(styrene), poly(acrylate) derivatives, particularly preferably poly(methyl methacrylate) or poly(cyclohexyl methacrylate), or copolymers of these polymers with other acrylates, such as, preferably, styrene-acrylonitrile copolymers, styrene-ethyl acrylate copolymers or methyl methacrylate-ethyl acrylate copolymers, and

the interlayer is preferably built up from methyl methacrylate-allyl methacrylate copolymers.

5. Use according to at least one of Claims 1 to 4, characterised in that the shell in the core/shell particles is essentially built up from a UV radiation-degradable material, preferably a UV-degradable organic polymer and particularly preferably from poly(tert-butyl methacrylate), poly(methyl methacrylate), poly(n-butyl methacrylate) or copolymers containing one of these polymers.

6. Use according to at least one of the preceding claims, characterised in that the core in the core/shell particles comprises a metal or semi-metal or a metal chalcogenide or metal pnictide, particularly preferably silicon dioxide or titanium dioxide.

7. Use according to at least one of the preceding claims, characterised in that the core/shell particles have a mean particle diameter in the range about 50 – 800 nm, preferably in the range 100 – 600 nm and particularly preferably in the range from 200 to 450 nm.

8. Use according to at least one of the preceding claims, characterised in that the cores have a surface modification, preferably with silanes carrying reactive end groups, such as epoxy functions or free double bonds.

9. Use according to at least one of the preceding claims, characterised in that the mouldings are films.

10. Process for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities, characterised in that

a) core/shell particles whose core is essentially solid, is built up essentially from an inorganic material and has an essentially monodisperse size distribution and is connected to the shell via an interlayer, are converted into mouldings, preferably films, with application of a mechanical force and elevated temperature,

b) one or more precursors of suitable wall materials are added,

c) and the shell material is subsequently removed.

11. Process for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities according to Claim 10, characterised in that the application of a mechanical force takes place in a step a2) to a mass of the core/shell particles pre-dried in step a1).

12. Process for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities according to Claim 11, characterised in that the application of a mechanical force takes place through uniaxial pressing or during an injection-moulding operation or during a transfer moulding operation or during (co)extrusion or during a calendering operation or during a blowing operation.

13. Process according to at least one of the preceding claims, characterised in that the core/shell particles are cooled under the action of the mechanical force to a temperature at which the shell is no longer flowable.

14. Process for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities according to at least one of the preceding claims, characterised in that the precursor in step b) is a solution of an ester of an inorganic ortho-acid with a lower alcohol.

15. Process for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities according to at least one of the preceding claims, characterised in that step b) is carried out under reduced pressure, preferably in a static vacuum where $p < 1$ mbar.

16. Process for the production of mouldings having homogeneous, regularly arranged cavities and particles in the cavities according to at least one of the preceding claims, characterised in that step c) comprises a calcination, preferably at temperatures above 200°C, particularly preferably above 400°C.

17. Process according to at least one of Claims 10 to 15, characterised in that the shell is removed by UV irradiation.

18. Mouldings having homogeneous, regularly arranged cavities, characterised in that the regularly arranged cavities essentially each contain one particle.

19. Mouldings according to Claim 18, characterised in that the particles consist of an electrically and/or magnetically conductive material or have an electrically and/or magnetically conductive layer or have an electrically and/or magnetically conductive core, where the electrically and/or magnetically conductive material is preferably a metal or magnetite.

20. Mouldings according to at least one of the preceding claims, characterised in that the cavities have a mean diameter in the range about 50 – 500 nm, preferably in the range 100 – 500 nm and very particularly preferably in the range from 200 to 280 nm.

21. Mouldings according to at least one of the preceding claims, characterised in that the cavities are embedded in a matrix which preferably essentially comprises a metal chalcogenide or metal pnictide, particularly preferably silicon dioxide, titanium dioxide and/or aluminium oxide.

22. Use of mouldings according to at least one of Claims 18 to 21 and/or of mouldings produced in accordance with at least one of Claims 10 to 17 as photonic material.

23. Use of mouldings according to at least one of Claims 18 to 21 and/or of mouldings produced in accordance with at least one of Claims 10 to 17 for the production of electro-optical devices.

24. Electro-optical device containing mouldings according to at least one of Claims 18 to 21 and/or mouldings produced in accordance with at least one of Claims 10 to 17.